

REMARKS

Applicants respectfully request reconsideration and allowance of the present application. By this Amendment, Applicants editorially amend the specification. Applicants also herein cancel claim 7 and amend claims 1, 4-6, 9, 12, 13, 15, 21, 31, 34, 39 and 48. Claims 1-6 and 8-49 remain pending in the application.

Amendments to the Specification and Claims

As suggested in the Office Action, the specification has been amended to update the cross-reference to related applications. In addition, claim 31 has been amended for clarity of the invention.

The Office Action suggested that clarification of claims 1, 32 and 48 was required, but did not explain why. It is believed that the claims were clear in view of the specification and the understanding of those skilled in the art.

For example, claim 1 sets forth a “configuration specification including a predetermined portion and a user-defined portion.” The specification explains that the system of the Killian patent allowed configuration of a core (i.e. predetermined) register file, while the present invention allows extension of the core processor logic with extension instructions that are included in the configuration specification at the user’s discretion. For example, beginning at page 11 line 16, the present specification explains how user-defined register files can be added to the configuration specification through use of the regfile construct. Nevertheless, claim 1 has been even further clarified to set forth that the predetermined portion specifies configuration of a core register file, and the user-defined portion specifying whether to include a description of a (i.e. one or more) user-defined register file. Accordingly, the objection to this claim should be withdrawn.

As for claim 32, the present specification beginning at, for example, page 40, line 5, describes how new software data types can be associated with the user-defined register files. For at least this reason, no clarification or correction of claim 32 is considered necessary.

As for claim 48, the present specification beginning at, for example, page 63, line 14, describes how new exceptions can be added to the configuration specification, including when a

processor instruction raises the exception. Although claim 48 has been amended herein to even more explicitly define the invention as explained more fully below, no further clarification or correction of claim 48 is considered necessary.

Rejection of Claims Under 35 U.S.C. § 102

In the Office Action, the Examiner rejected claims 1-46, 48 and 49 under 35 U.S.C. § 102(e) as being unpatentable over Killian et al., Pat. No. 6,477,697 (“Killian”).¹ A rejection under § 102 requires that each and every limitation in the claims be found in a single prior art reference. For reasons set forth more fully below, this rejection is respectfully traversed.

Amended Independent Claim 1 Patentably Defines Over Killian

As set forth fully in the specification at, for example, page 8, lines 18-24, the present invention introduces advantages over the prior art -- specifically including Killian -- such as providing the ability to add new register files to the description of a configurable processor.

Killian did not teach or suggest the ability to include additional user-defined registers to the hardware description of a configurable processor. Killian did allow configuration of core register files (i.e. in size or width) at, for example col. 4, lines 1-11. However, these core registers are predetermined and must be included in the specification. Killian did not teach the ability to allow a user to specify the generation of completely new register files and include them in the hardware description in addition to the core register file.

To more explicitly define the invention over the prior art, independent claim 1 has been amended herewith to require:

hardware generation means for, based on a configuration specification including a predetermined portion and a user-defined portion, generating a description of a hardware implementation of the processor, the predetermined portion specifying a configuration of a core register file, and the user-defined portion specifying whether to include a user-defined register file in the processor in addition to the core register file;

¹ At all pertinent times, the Killian patent has been owned by the same assignee of the present application. Accordingly, Killian is not available as prior art under 35 U.S.C. § 103.

wherein the hardware generation means includes register generation means for, based on the user-defined portion of the configuration specification, including generating a description of the a user-defined register file separate from and in addition to a description of the core register file in the description of the hardware implementation of the processor

This subject matter is not taught or suggested in the prior art, including Killian. Accordingly, independent claim 1 is patentable for at least this reason.

Moreover, claims dependent from claim 1 define various features of accessing the user-defined register files, including determining the number of read / write ports, scheduling, interlock logic, pipeline logic, etc. The Office Action points to various descriptions in Killian, but none of these references teach or suggest the claimed features in relation to user-defined register files as required by the present claims. Accordingly, the Office Action fails to provide a basis for these rejections under 35 U.S.C. § 102.

For at least the foregoing reasons, independent claim 1, together with claims 2-38 that depend therefrom, patentably define over the prior art and the § 102 rejection of these claims should be withdrawn.

Amended Independent Claim 39 Patentably Defines Over Killian

Amended independent claim 39 requires that the configuration specification, from which the hardware description is generated, includes “a statement specifying scheduling information of instructions used in the software development tools” and that the hardware generation means determines whether and how to generate a hardware description of “at least one of pipeline logic, pipeline stalling logic and instruction rescheduling logic” based on the statement in the configuration specification.

Although Killian describes a processor including pipeline logic, Killian does not teach determining whether and how to generate the required types of logic based on a corresponding statement in a configuration specification, as required by amended independent claim 39. Killian at col. 14, lines 28-39 merely teaches basic software tools for supporting data transfer to and from user-defined states. These methods are used by an operating system to schedule tasks.

This does not teach anything about generating a hardware description of the required types of logic set forth in claim 39.

For at least this reason, amended independent claim 39, together with claims 40-44 that depend therefrom, patentably define over the cited prior art and the § 102 rejection of these claims should be withdrawn.

Independent Claim 45 Patentably Defines Over Killian

The rejection of independent claim 45 is improper because Killian does not teach each and every limitation of claim 45. For example, claim 45 requires a “document generation means” that is not required in claim 1. Nowhere does Killian teach such a means, as the Office Action implicitly admits by failing to identify any alleged teaching. For at least this reason, independent claim 45, together with claims 46 and 47 that depend therefrom, patentably define over the prior art and the § 102 rejection of these claims should be withdrawn.

Amended Independent Claim 48 Patentably Defines Over Killian

Independent claim 48 has been amended to even more explicitly define that:

wherein the user-defined portion of the configuration specification includes a user-defined specification of a processor exception and when a processor instruction raises the exception; and

the hardware generation means includes user-defined exception support generating means for generating hardware supporting that user-defined exception as part of the processor hardware implementation.

Although Killian teaches processor exceptions, nothing in Killian teaches the user-defined specification of a processor exception, and the ability to generate a hardware description of that user-defined exception, as required by claim 48. Accordingly, amended independent claim 48 patentably defines over the prior art, and the § 102 rejection of this claim should be withdrawn.

Independent Claim 49 Patentably Defines Over Killian

Independent claim 49 patentably defines over Killian because claim 49 requires “cosimulation means” for operating the hardware simulation means and the software simulation means and comparing the results therefrom. This is a design verification technique made possible by the present invention for comparing states in two different simulations dynamically during simulation.

The Office Action points to a paragraph in Killian that allegedly teaches this subject matter. However, this passage merely describes a logic block diagram representing state. It does not teach a cosimulation means that operates a hardware simulation means and software simulation means and comparing the results of simulations therefrom, as required by claim 49.

For at least this reason, claim 49 patentably defines over Killian and the § 102 rejection of this claim should be withdrawn.

Allowable Subject Matter

Applicants appreciate the Examiner’s indication that claim 47 would be allowable if rewritten in independent form. However, it is believed that claim 47 is allowable at least by virtue of its dependence from allowable claim 45. As set forth more fully above, the prior art does not teach a document generation means required by claim 45.

Conclusion

All objections and rejections having been addressed, and in view of the foregoing, the claims are believed to be in form for allowance, and such action is hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, he or she is kindly requested to contact the undersigned at the telephone number listed below.

Respectfully submitted

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